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THE REVOLUTION IN MILITARY AFFAIRS:
A Framework for Defense Planning

Michael J. Mazarr

U.S. Army War College

THE REVOLUTION
IN MILITARY AFFAIRS:
A FRAMEWORK
FOR DEFENSE PLANNING

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In April 1994, the Army War College's Strategic Studies Institute hosted its Fifth Annual Strategy Conference. The theme of this year's conference was "The Revolution in Military Affairs: Defining an Army for the 21st Century." Scholars, soldiers, and defense analysts from throughout the nation and Europe gathered to consider the vitally important impact that rapid technological advances have on strategy, operations, training and force structure.

The author of this monograph, Dr. Michael J. Mazarr, argues that the current revolution in military affairs is part of a larger sociopolitical transformation. The new technologies both propelling and resulting from this transformation are having a profound impact on warfare. Dr. Mazarr urges military and civilian strategists, planners, and decisionmakers to think about armed conflict in ways so novel that those used to dealing with "the unchanging truths about war" may feel threatened. To help deal with the ambiguities and complexities presented by the RMA, Dr. Mazarr offers a framework of four principles for defense planning.

Whether or not the reader accepts the framework suggested by Dr. Mazarr, one cannot but be impressed by the implications the RMA has for warfare. Accordingly, this monograph warrants careful consideration.
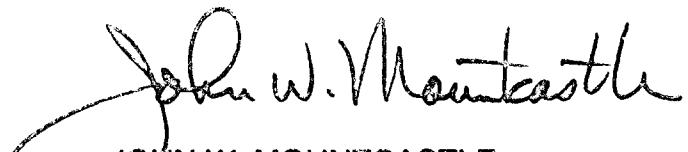
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BIOGRAPHICAL SKETCH
OF THE AUTHOR

MICHAEL J. MAZARR is Legislative Assistant and Chief Writer in the office of Rep. Dave McCurdy (D-OK). Dr. Mazarr holds A.B. and M.A. degrees from Georgetown University and a Ph.D. from the University of Maryland School of Public Affairs. He is an Adjunct Professor in the Georgetown University National Security Studies Program, and he served in the U.S. Naval Reserve for seven years as an intelligence officer. Before coming to the House, Dr. Mazarr was a Senior Fellow in International Security Studies at the Center for Strategic and International Studies, where he directed a number of major projects. He has authored five books, edited five anthologies, and published a number of scholarly articles.

THE REVOLUTION IN MILITARY AFFAIRS:
A FRAMEWORK
FOR DEFENSE PLANNING

I

In the summer of 1805, the luck of the French Empire seemed to have run short. Napoleon's bold plan to leapfrog the channel and invade England had collapsed, and his legions sat idly opposite England. To the east, Russia and Austria had unified against France and appeared ready to crush the young Emperor. Prussia stood by, refusing alliance with the Russians and Austrians but eager to join in the post-war autopsy once the French had received a death blow.

Within a few months, Napoleon had smashed the combined Russian and Austrian armies, demanded and received a military alliance with Prussia, and once again dominated the European balance of power. The way in which Napoleon achieved this dramatic turn of events says a great deal about the nature, and inherent risks and opportunities, of a revolution in military affairs. Seeing that his English adventure was checked, Napoleon wheeled his army and drove it rapidly to the east, covering 15 miles or more a day. His goal: to destroy the Russian and Austrian armies before Prussia had become engaged.

In this grand strategic maneuver, Napoleon took full advantage of the evolving revolution in military affairs. He employed a massive army produced by universal conscription and the advent of a truly citizen-based military force. He pushed this force along using the most advanced logistics planning of his day. And he operated based on a decisive notion of strategic action that would lay the groundwork for fundamental military tenets that survive to this day.

Once engaged in battle, in this case at Austerlitz, Napoleon employed operational tactics as bold and decisive as his

strategic vision. His combined-arms formations maximized the fighting power of his army, and he used some of the most sophisticated battlefield communication techniques of the time.

Napoleon emerged during the infancy of a profound revolution in military affairs. This revolution, incorporating such new features as citizen armies, long-range rifles and artillery, and mechanization, would transform the nature of warfare during the 19th century and much of the 20th. Napoleon's operations were a preview of a new era of warfare–warfare of the industrial age–that would come to full flower in the two World Wars of the 20 century.

Through his foresight and genius, Napoleon made himself the beneficiary, rather than the victim, of these events. His brilliant maneuver in the fall and winter of 1805 ensured his rule for another decade.

II

The transformation we face in the nature and conduct of warfare is no less fundamental than that of Napoleon's time. A powerful combination of social, technological, and political developments is revising the role of military force in national policy and changing the way wars are fought. In responding to this dizzying pace of change, our challenge is the same as Napoleon's: to seize the opportunities of this new era in warfare, to make it work for us rather than against us.

No true revolution in military affairs is a narrowly military phenomenon. It is, in the most fundamental sense, the product of a broad social and political transformation which gives rise to new military organizations and technologies.[1] Together, these changes demand substantial reforms in existing methods of conducting warfare.[2]

The revolution in military affairs underway today is, of course, the revolution in information, sensing, and precision strike technologies.[3] Modern military forces can conduct their operations with an unprecedented, and revolutionary, degree of precision. Once able only to guess at where they were, today's soldiers can instantly determine their precise location

through the Global Positioning System. Where once a commander might have little idea where his troops were, today military leaders can watch battles unfold on computer screens and issue moment-by-moment corrections.[4]

One finds little discussion of these ideas in the U.S. Department of Defense's recently-completed Bottom-Up Review.[5] Former Secretary of Defense Les Aspin initiated the review with the laudable goal of rethinking the basis for U.S. defense planning. It placed emphasis in many of the right areas: readiness, keeping forces for more than one regional war, acquisition reform. And the review built a substantial consensus in the Pentagon behind the new force structure.

Nonetheless, the review offers a classic example of military leaders planning to fight the last war. The report's proposed force for a single regional contingency–four to five Army divisions, four to five Marine brigades, 10 Air Force fighter wings, 100 heavy bombers, and four to five carriers–mirrors almost exactly the forces deployed in Operation Desert Storm. The review offers precious few thoughts on new technologies or techniques that might change the nature of war in coming decades.

Such a limited focus was probably inevitable in the review, which focused on defense planning for the next 7 years, not the next 20 or 30. But deeper thinking is now called for, and is in fact underway throughout the Department of Defense.[6] We are in the midst of a revolution in military affairs (RMA). It is a post-nuclear revolution, a return to an emphasis on nonnuclear warfare, both conventional and unconventional. It stems, among other things, from an increasingly decentralized, information-based society, an interdependent world economy, and the dramatic effects of new military and civilian technologies.

And if we look carefully, the RMA can provide a coherent framework for thinking about the future of warfare and defense policy. It points to those principles of defense planning and military art that will dominate warfare in the coming decades.

This monograph's purpose is to lay out that framework and those principles–to describe where the revolution in military

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affairs leads us in military planning. It begins by looking at the future of warfare and world politics, to determine what challenges will confront the U.S. military in coming years. It then offers four principles as the framework for future U.S. military strategy: information dominance, synergy, disengagement, and civilianization. Each represents not a new phenomenon, but merely the culmination of historical trends. Each alone embodies an evolutionary change in the nature of warfare; together their effect is revolutionary.

One important question needs to be asked at the outset: Is the RMA a revolution in *warfare* or in the *weapons, doctrines, and organizations* which fight it? The answer is both, and in fact the two interact. The nature of war itself is indeed changing. Conventional, head-to-head clashes of high-technology field armies have been for several decades giving way to guerrilla conflicts, mixed regular and irregular wars, terrorism, non-state conflict, and a host of new information-based military efforts.

Even traditional, high-intensity war has changed dramatically from the days when it consisted of a search for the single, decisive battle against the enemy army in the field. Modern war involves simultaneous, high-precision attacks across a range of civil and military targets to achieve a decisive result.

This change in the nature of war is spurred by, but also somewhat independent from, a second revolution underway in the nature of the weapons, doctrines, and organizations available to the U.S. military. In some cases, the two revolutions are closely intertwined; thus the technology of information warfare changes the nature of large-scale combat. In other cases, however, a substantial mismatch may arise between the two parallel revolutions, as when high-tech U.S. information war units are unable to conduct guerrilla warfare.

Any framework for defense planning must therefore address itself to this complex and shifting mosaic of the nebulous "revolution in military affairs." Our goal must be to understand the two layers of that revolution and build a military institution capable of responding to both. The four principles outlined below represent one effort to do so.

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In his latest novel, *Cauldron*, Larry Bond paints an unhappy picture of world politics in the next century. Harmony in the West has collapsed, the victim of a full-scale global depression, trade wars, resurgent authoritarianism in Germany and (of all places) France, and conspiring European industrialists. The ugly face of war returns to Europe—and not, as might be expected, initially between the West and a resentful, nationalistic East, but rather among the very Western nations which had supposedly transcended the practice of warfare itself.

Bond's scenario is simplistic and somewhat far-fetched, to be sure, but it is nonetheless disturbing. For he has tapped into the most hotly-debated foreign affairs issue of the day: the future of international politics. With the end of the cold war, everything we thought we knew about the world community has been turned upside down. What was predictable has become unpredictable. Governments and regions that were stable have collapsed into hostility and civil war.

These developments force us to ask basic questions anew: What will the world look like 5, 10, or 20 years from now? And in that context, what is the future of warfare?

A close examination of the nature of world politics and of the factors that give rise to conflict suggests that any effort to explain or model or predict the behavior of nation-states or the future of warfare is doomed to fail. New mathematical theories of nonlinear, unpredictable relationships—the chaos theory popularized in the book and movie *Jurassic Park*—provide a more telling portrait of international relations than the more traditional, linear models in favor for the last four decades.

In general terms, linear systems rely on equations whose elements can be written on one line, and which share the characteristics of *proportionality* (where changes in input are proportional to changes in output) and *additivity* (meaning that the whole is equal to the sum of the parts). Linear equations can be terribly complex, but they are nonetheless deterministic. Knowing the inputs means knowing the outputs; to understand

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a system now is to understand it later, to be able to forecast and predict its behavior and development.[7]

Nonlinear, or chaotic, systems do not enjoy those convenient features of predictability and determinism. Chaotic systems are characterized by random interactions, complex feedback loops, and wild changes in results based on small variations in initial conditions.[8] These factors combine to produce events that do not conform to clear, predictable patterns. The bigger and more intricate a system, the harder prediction becomes; the more points of interaction, the more chance and chaos.[9]

One aspect of chaotic systems makes them especially unpredictable, a phenomenon known as "sensitive dependence on initial conditions." Tiny changes in initial assumptions or circumstances (in fact, *immeasurably* small changes) can produce completely different outcomes. This feature of chaos is perhaps most evident in the weather: as demonstrated by computer models, weather patterns can evolve dramatically, even wildly, based on trivial shifts in winds or temperature.[10] This phenomenon is sometimes called the "butterfly effect," after the tongue-in-cheek metaphor of some chaos theorists that a butterfly flapping its wings over Beijing could, through a series of complex interactions, produce a thunderstorm over New York.

But chaos does not imply total disorder. A form of order arises even within chaotic systems. This order is manifest in the form of "attractors," a set of points around which chaotic results tend to group. Chaotic systems have their own rules, their own trends, their own tendencies. These trends are not linear—they cannot be fully predicted—but they exist nonetheless.

From this brief description, it should be readily apparent that world politics is chaotic. It is a complex system with many interdependent actors and variables, and every action begets unpredictable reactions. Very soon, even the most complex linear models of the behavior of nations break down, as events spin out of the control of forecasting.[11]

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World politics is especially susceptible to the butterfly effect. As the eminent historian Robert Conquest has put it, "In history and politics, in fact, the accidental, the totally unpredictable, is often decisive." Moreover, Conquest argues, "the decisive turn may be due to some quite trivial occurrence, hardly entering into the observer's consideration."[12]

John Lewis Gaddis makes this case forcefully in a recent essay that asks why political scientists did not do a better job of predicting the end of the cold war. Against the trend of international relations theories that have tried, in the words of Hans Morgenthau, to develop a predictive "science of international politics," Gaddis argues that the chaotic elements of world politics make prediction fruitless. "Surely human affairs, and the history they produce," Gaddis concludes, "come closer to falling into the unpredictable rather than the predictable category." Not only are "the potentially relevant variables virtually infinite, but there is the added complication" of human self-awareness, which adds an even further twist to the feedback loop.[13]

The essentially chaotic nature of world politics is mirrored in warfare. Combat itself is a chaotic enterprise, dominated by such elements as feedback, sensitive dependence on initial conditions, and chance. At least one observer contends that this conclusion represents Clausewitz's central message.[14]

Martin van Creveld similarly suggests that the relationship between technology and warfare—an intersection at the core of the RMA—is chaotic. "Given the sheer number of the points of contact between technology and war," van Creveld points out, "it is exceedingly difficult to discern long-term trends," especially because the nature of technology and its relationship to war "are connected, interacting, and interchangeable." Van Creveld writes that "the interaction of technology and war at any given time has been as much the product of the arbitrary and the accidental as it was of the inevitable and the necessary."[15]

It therefore appears that the future of international politics, the future of warfare, and the operational details of war defy prediction. The history of each of these three subjects is written

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in chaotic, rather than linear, form, and U.S. military planners cannot reliably know how they will evolve in the future.[16]

This may seem like a common-sense conclusion, but to take it seriously is to draw some very specific implications for defense planning. Over the next two decades, U.S. planners will face a shifting, erratic menu of conflict. Small changes in world politics or national behavior can have dramatic and unpredictable effects. Traditional, comfortable ways of war will give way to dramatic new forms of high-technology combat and to ever more sinister forms of irregular warfare. As we respond to these changes, the model of chaos offers strict cautions about the degree to which we can influence the outcome of political or military events.[17] In developing a framework for military planning, therefore, the United States cannot make any decisive assumptions about the precise enemies or conflicts it will face during the next two decades.[18]

Accepting these ideas would entail rejecting analyses that nominate one form of warfare as the singular or dominant threat in the future.[19] It would deny the truth of end-of-history optimism and the belief that major war is impossible, whether because of cultural factors or because of a shift to a "geoeconomic" era.[20] At the same time, it would reject realist pessimism that suggests large new wars are inevitable.[21] Anything, quite simply, is possible.

This model of international relations and warfare establishes a difficult challenge for military planners: to find a broad framework capable of guiding decisions on military doctrine, force structure, organization, and procurement that will preserve U.S. capabilities at each level of warfare, from operations short of war to peacekeeping and counterinsurgency missions to major war.[22] This monograph now turns to outlining such a framework.

IV

At the base and core of the RMA, the substructure that holds its framework in place is *information*. Information has always been the cornerstone of warfare, the pivot on which decisions and strategies turned, and this is more true now than

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ever. As the military revolution of the information age, the RMA is itself a function of the incredibly rapid, precise, and broadly shared information that now circulates among modern military units.[23]

It is easy to see why information resides at the core of the RMA.[24] Knowledge of the enemy's location provides the basis for military action. Precise location of enemy targets is necessary for precision-guided munitions. Amid the swift pace of modern battle, the rapid exchange of information about the status of the fight and reliable, real-time command and control are indispensable to success.[25] To achieve mastery of this realm, U.S. forces will seek *information dominance*—acquiring the necessary information for friendly forces while denying it to the enemy.[26]

These facts are all well-known to military professionals by now. The phrase "information warfare" abounds in military journals and books on defense planning. What specific implications does it hold for military planning?[27]

First and most fundamentally, conducting warfare in the information age will require a doctrine for information warfare. Military planners must have a precise idea of how information fits into operations and how it should be handled and disseminated.[28] In basic terms, this doctrine should provide for the acquisition and sharing of information by friendly forces and denying those things to the enemy. It should establish a plan for "getting inside the enemy's decision loop," as U.S. and coalition forces did so successfully in the Gulf War. Information dominance also represents a far cry from the war of single battles characteristic of Clausewitz's thought; warfare now involves simultaneous operations against a broad spectrum of military and civilian targets.[29]

A doctrine for information warfare will have to address a host of issues. One is hierarchy. Removing unnecessary layers of authority by streamlining decision making has been a hallmark of civilian exercises in total quality management, and to some extent is relevant to military command structures as well. Insightful military leaders have spoken for years about the notion of "powering down," having as many decisions as

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possible made at lower levels to promote efficiency and initiative.[30] At the same time, hierarchy is essential to effective command and control, and to a certain extent better information will allow more decisions to be taken at a *higher* level—the all-seeing task force commander. And yet centralized command structures are especially vulnerable in an era of precision weapons, a lesson taught again to Iraq in the Gulf War.

Such a doctrine must also answer the question of how much and what kind of information, and information technologies, the United States will share with its allies. Coalition warfare seems to be an established trend. At a minimum, effective communication with allied forces will be a must; and yet some in the Defense Department will certainly object to transferring or sharing their most advanced command and control equipment. This effect is an example of a disturbing trend: all four principles outlined in this monograph make it more difficult for the United States to integrate allies into its military efforts precisely at the moment when political incentives demand that it do so to a degree unprecedented since 1945.

A doctrine for information warfare will also lead to a new understanding of "intelligence." Traditionally, intelligence, both strategic and tactical, has been partly divorced from the conduct of battle. Facts about enemy strategic intentions, or even the location of a moving enemy tank brigade, were gathered by intelligence units, analyzed, and eventually sent forward to combat units—which often discounted their veracity. Even in the Gulf War, this process often took as long as 48 hours.

The future may see the gradual disappearance of a separate and distinct function called military intelligence. Frank Kendall of the Defense Department has argued that new technology "blurs the operational planning and intelligence boundary to the point of invisibility."[31] U.S. forces will need information about enemy movements on a real-time basis. Those facts will no longer be able to be cordoned off in a distinct organization separate from warfighting units. Intelligence officers as such may continue to exist, but they will be more integrated than ever before into actual military operations—an

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example of the importance of synergy, which will be discussed below.

The authors of an information doctrine will confront thorny issues related to democracy and freedom of the press. An information revolution is taking place in the media just as it is in warfare. Television networks may soon have observation satellites of their own, reporters with tiny hand-held cameras able to move around the battlefield, and other intrusive technologies. Future U.S. political leaders will have to decide whether to restrict or shut down such broadcasts, and if so by what criteria.

Information warfare also demands new kinds of military organizations. At the extreme, looking at the varied requirements and possibilities of information warfare, Martin Libicki and James Hazlett have proposed the creation of an "information corps."[32]

A very different kind of information war doctrine will be required for irregular warfare. Control of information in a guerrilla or low-intensity conflict environment is just as important as in high-intensity war, perhaps even more so. After all, guerrilla warfare is essentially information warfare—a contest of military hide-and-seek and political allegiance. In this sort of war, obtaining information about the enemy and controlling the political debate are essential. But the means by which it is applied will be very different from conventional war. In particular, information war in unconventional conflicts will rely on human intelligence, special forces, and advanced sensors capable of detecting guerrilla groups. It also suggests an expanded role for psychological operations and civil affairs units, perhaps even, as the Tofflers have proposed, the creation of a "rapid reaction contingency broadcasting force."[33]

War in an information age carries a number of risks as well, and the architects of a new doctrine must take them into account.[34] For one thing, vast amounts of information can be as crippling as they are liberating. Already U.S. troops in the Gulf War have begun to speak of information overload on the battlefield, the profusion of so many facts and orders that the result was confusion and frustration. Flexibility could be the first

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casualty in a new, rigid hierarchy of interwoven and automated command. In computer-driven warfare, units might increasingly be viewed as pawns in a game rather than as autonomous fighting forces capable of initiative

Clausewitz's venerable notion of friction suggests the particular danger of this trend. Things go wrong in war. Plans go awry, units fail to complete their assigned missions, commanders become confused. War, as suggested above, like international politics, is a chaotic enterprise. Any doctrine of information that relies on neat, linear control is bound to receive a nasty shock when it confronts the enemy and the fog of battle.

This result is especially likely because the sophisticated technologies that support information warfare–satellites, for example, along with computers and downlink stations and other tools–are often very sensitive pieces of equipment that can themselves be disabled by a cunning enemy. As Alvin and Heidi Toffler have pointed out, militaries have no monopoly on computer technologies, and ingenious hackers could destroy U.S. computers with a well-placed electronic virus.[35] The U.S. military must study much more carefully its information vulnerabilities–whether to an anti-satellite weapon, an electromagnetic pulse, or the use of guerrilla warfare tactics by an enemy unwilling to be massacred on a traditional battlefield.[36]

V

The RMA points to a second principle of defense planning, one which, like information, serves as a force multiplier by magnifying the fighting ability of existing military units. This second principle is *synergy*–or, to use a more common term, *jointness*. It is the ability of different services, branches, and weapons to fight effectively together, to marshal their unique capabilities into a whole that is greater than the sum of its parts. Most revolutions in military affairs are indeed only revolutionary when their various aspects work together, and the present RMA is no different.

Advances in military technology have made synergy more important than ever. The faster and more precise war becomes, the more need there is for tight and continuous cooperation among various kinds of forces.[37] Precision-guided weapons are useless without adequate targeting data. Stealthy bombers will hardly be worth the price if they arrive over the target only to drop dumb bombs. The ability of units to move, on the ground or in the air, with lightning speed will be wasted if the command and control system cannot keep up.[38]

Synergy is intimately related to the revolution in information mentioned above. Communication is the lifeline of synergy, the means by which various parts of the force are able to cooperate. Interoperable command and control systems thus take on critical importance because they stand at the junction between two principles of the RMA.[39]

Over time, the evolution of synergy within the military may have one especially notable effect: it might overwhelm the current roles and missions debate. To begin with, one should recognize that redundancy is sometimes good[40] and that, partly as a result, the fiscal savings to be found in eliminating "wasteful redundancies" are bound to be disappointingly small. Synergy should not be perceived as rooting out all aspects of redundancy, but rather making the various forces work better together.[41]

In the current, tender moment in defense planning, moreover, a divisive debate over roles and missions could do grievous harm to the ultimate goal of synergy. Interservice relations are already on eggshells, as the services scramble for their piece of a shrinking defense budget and try, in the process, to continue the trend of jointness. If a roles and missions review were to launch a full-scale attack on established means of doing business, save $10 billion and leave, amid the rubble, new loathing between the Army and the Air Force, the exercise would have been a failure, not a success.

Finally, the supposed either-or choices offered by advocates of a roles and missions review will seldom be so easy. As a major military power, the United States will continue

to maintain certain classes of weapons-fighters, strategic bombers (probably), aircraft carriers, tanks, and so on-indefinitely.[42] Only relatively marginal systems or capabilities will be capable of elimination based on a readjustment of roles and missions.

The lesson is clear enough. *To portray the roles and missions review as a budgetary exercise is a serious mistake.* In the long run, the goal is synergy, which will produce its own efficiencies. Military planners must not allow an angry debate over roles and missions to slow progress toward that goal.

In fact, the RMA and its principle of synergy can help solve this problem by eventually taking the roles and missions debate off the table. Questions of which service will perform which role, mission, or function are likely to give way to a broader and more fundamental question: How can the capabilities of the various services be marshalled to accomplish specific jobs? Military planners will simply discard the notion that missions belong, in any meaningful sense, to one or another service. When all the services are viewed as a single, cooperating, organic whole, the scope of the roles and missions debate changes completely. This argument replicates the distinction, made by Admiral William Owens, between "specialization" and "synergism" as models of jointness.[43]

An even tougher challenge than promoting synergy among U.S. military services is doing the same thing within multinational coalitions. Coalition warfare is a growth industry, and U.S. military planners must find ways to maximize the proficiency of those coalitions and to make sure that the United States is playing the most efficient role possible in them. This means, at a minimum, a reliable means of command and control within a coalition enterprise. It means peacetime exercises, military-to-military contacts, and full-time liaison officers. Again, coalition operations are becoming more challenging even as they become more necessary.

Finally, the concept of synergy also stands at the core of irregular warfare. In unconventional war, it is the combination of political, economic, and military elements of strategy that is decisive. As was so often said during the Vietnam War, military

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means alone could not win a guerrilla war; only a broader approach will work. That is as true in Somalia or the Sudan now as it was in Vietnam then, and it displays, once again, the importance of the principle of synergy.

A renewed emphasis on synergy therefore carries a number of implications. Most important to such progress will be a growing emphasis on jointness. The U.S. military needs even more joint assignments, joint schools, joint exercises, and joint thinking.[44] A Joint Warfighting Center is already in the process of being created.[45] The continued evolution of a much more detailed joint doctrine is especially important.[46] Flexible, all-arms combat teams incorporating land, sea, and air forces will become even more ubiquitous in the future, and the military should assemble and train such units together more frequently in peacetime, a trend already underway with adaptive joint force packaging in the Atlantic Command[47] and with the imminent formation of Joint Task Force-95. The next logical step, as proposed by Admiral Owens, is the creation of joint commands at the level of corps, fleet, and air force to operate "jointly on a continual basis."[48]

Second, when contemplating peacekeeping or counterinsurgency operations, U.S. defense planners must keep in mind the necessary synergy between political, economic, and social as well as military factors. This calls for closer military coordination among U.S. and allied military forces, international relief organizations, U.S. and allied foreign aid offices, and political analysts and experts. It suggests the need for U.S. forces permanently trained in the unique synergy of irregular war, or, at a minimum, permanent liaison officers between U.S. military forces and these other actors.

And third, military planners must extend the principle of synergy into the realm of procurement. Complete standardization would be a mistake. But in at least a few instances, services can work together on joint projects under the direction of joint program offices. One major example, on which some cooperation is already underway, is a new generation of tactical fighter. But by far the most important target for joint procurement is an integrated command, control, and communications system.[49]

A third principle suggested by the RMA is *disengaged combat*. In the future, U.S. and allied military forces are likely to conduct their operations at a healthy distance from their enemy. This fact carries a number of implications for force structure and technologies.

Close contact with the enemy has always been a perilous endeavor. It exposes U.S. forces to direct fire and the risk of substantial casualties. This is especially true when the United States confronts the Soviet-style armies still common in regional aggressor states; the militaries of North Korea, Iraq, Iran, and other rogue nations rely heavily on masses of armor and artillery operating in close contact, on direct fire and relatively close-range indirect fire, to wear down their opponents.

The spread of weapons of mass destruction will make close contact even more deadly. Chemical and biological weapons are frequently delivered by artillery or short-range attack aircraft. Until long-range ballistic or cruise missiles have spread further, nuclear weapons in the hands of regional aggressors will probably be carried by attack aircraft as well.[50]

In high-intensity war between modern states, moreover, close contact is becoming increasingly lethal. The RMA is making it easier for military forces to locate and destroy the enemy than at any time in history. One need only imagine what a war would be like between *two* sides with the U.S. capabilities displayed in the Gulf. Eventually, the movement of large-scale forces on the battlefield may be tantamount to suicide, and modern mechanized warfare may become the contemporary equivalent of the Somme.[51] The first hints of this in recent times came via the massive attrition rates of the Arab-Israeli wars.[52]

In broader terms, Clausewitz's notion of friction or the fog of war—perhaps the most fundamental fact of life for military leaders in battle—becomes thickest in close quarters. It is there that units become misplaced, the mixture of enemy and friendly forces becomes confused, communications are disrupted, orders are mislaid, and things generally go awry. Disengaged

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combat still suffers from its own forms of friction, but they may be somewhat less crippling than those of the close battle.

From an operational perspective, therefore, U.S. forces have clear reasons to avoid close combat. Another reason is political. It is often said that, in an era of television wars and low tolerance for foreign adventures, U.S. operational commanders must avoid casualties at all costs. And now the Gulf War may have established an incredibly demanding standard against which future conflicts will be judged. Anything that helps minimize casualties would therefore greatly increase U.S. freedom of action, and disengaged combat would have such an effect.

All of this suggests that U.S. forces may endeavor to remain as far apart from their adversaries as possible in future wars.[53] U.S. forces will use their superiority in sensor technologies, weapons, and command and control to remain out of range of the enemy's main weapons while inflicting damage upon it. This is, obviously, not a new principle; the tactics planned for the thin-skinned British battle cruisers before World War I come to mind as an example of disengaged combat. This principle was already at work in the Gulf, where U.S. tanks and helicopters stood off at 3,000 yards or more and destroyed Iraqi tanks at will, and where U.S. aircraft flew higher than 10,000 feet, avoiding antiaircraft guns while using advanced sensors to achieve pinpoint accuracy with their precision-guided weapons.[54]

Admiral David Jeremiah has spoken of this process. "With longer range, greater precision, and horizontal integration of real-time intelligence and targeting," he argues,

> future weapons will be able to strike enemy forces at great distances. In mid- or high-intensity combat, it may not always be necessary to physically occupy key terrain on the ground, vital airspace, or critical chokepoints at sea in order to control them. While wars will still be won only when soldiers occupy the enemy's territory, it may not be necessary in every case to 'close with' the enemy in order to destroy him.

Jeremiah correctly warns that current ideas about "unit organization, tactics, and modes of thinking may not be appropriate to such a future."[55]

Disengaged combat reflects the culmination of a historical trend. For centuries, warfare consisted of the sum of a thousand individual battles fought with personal weapons. Warrior culture stressed physical strength, courage, and the willingness to kill and be killed in brutal fashion. As Sir Michael Howard has recognized, however, the progress of civilization has generally served to water down such values in Western populations, so that by World War II U.S. and British forces generally eschewed close combat. They preferred to call in the artillery rather than fix bayonets.[56] This trend continued through Korea and Vietnam, and stood in sharp contrast to the suicidal sacrifices routinely made by Chinese, North Korean, and Vietnamese units during those conflicts.

U.S. forces might achieve this goal in a number of ways. They could pursue disengaged combat strategically, by using forces divorced from the actual theater of combat–distant navy ships launching air strikes or cruise missiles, tactical air power based in a neighboring country, strategic bombers flying from the United States. The Air Force's new ideas of strategic airpower–simultaneous precision attacks against enemy command and control centers, power and communications grids, and transportation nodes–represent a form of disengaged warfare, allowing U.S. forces to place emphasis on targeting enemy assets besides, though including, military forces in close combat.

Tactically, a U.S. joint force commander would seek to fight the enemy without ever placing his (or her) forces within range of most enemy weapons. Using the greater accuracy of advanced sensors and precision weapons, U.S. forces could jockey just out of range of enemy artillery, tanks, and battlefield missiles, picking them off in turn. Such a practice might establish a hierarchy of enemy targets: those with the longest range–aircraft and missiles–would be destroyed first, followed by artillery, and finally mechanized or infantry combat units. As the enemy's ability to strike out diminished in range, U.S. forces

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would gradually advance on it and reduce the separation in forces, gaining in effectiveness as they did so.[57]

A doctrine of disengaged combat could help ease the pressure on U.S. defense industrial base policy. Given the massive attrition rates experienced in modern war, some observers see the major vulnerability in the industrial base as a loss of surge capacity.[58] With only a handful of suppliers left for each major weapons system, the industrial base would have insufficient slack to surge production and make up losses once a war began. Disengaged combat, by reducing the attrition to U.S. forces, would help hold casualty rates down and therefore reduce the need for surge production.

Disengaged combat holds little relevance to irregular warfare, and in fact may be the only one of the four principles that does not apply to both conventional and unconventional combat. 'n the ideal world, U.S. peacekeeping and counterinsurgency forces would be deployed in a manner that does not make them vulnerable to guerrillas or partisans but allows them to make use of their own weapons. But that will seldom be possible.

A corollary to disengaged combat is nonlinear combat. Irregular warfare has long been nonlinear; as we heard so often about the Vietnam War, there was "no such thing as a front line." If, as some have argued, irregular conflict represents the majority of future conflict, warfare as a phenomenon will therefore become that much less linear. The increasing lethality of the close battle suggests that even traditional, high-intensity combat will be increasingly nonlinear; the growing risk to large-scale deployed military forces encourages decentralization and dispersion. It emphasizes the value of more agile and hard-to-detect units such as airmobile or light mechanized forces as a substitute, in some cases, for heavy armor.

Rather than large units moving solidly in a single line of advance, future warfare might therefore see a more confused patchwork of dispositions, with U.S. and allied units in front of, among, and behind enemy forces. This trend is already evident in Airland Operations, which conceives a deep battle of several

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lines. Future warfare may look like AirLand Operations refracted through a multisided crystal, with each of its layers of operations broken into pieces and slices.[59]

The logical end-point of such developments is the replacement of the notion of concentration of mass with one emphasizing concentration of fire. No longer will units have to be massed together to achieve their effect. Instead, the combination of precision weapons of long range and advanced command and control systems will allow widely dispersed forces to focus their fire on specific points. Artillery and missile units tens of miles apart, special forces units across the battlefield, ships dozens or hundreds of miles offshore, and aircraft–including perhaps strategic bombers flying direct from the United States, and bombers firing cruise missiles from hundreds of miles away–could all direct their attack against a single enemy tank division, regiment, or battalion. "We may even reach the point," Admiral Jeremiah has pointed out, "at which fire and maneuver become essentially the same thing under some circumstances."[60]

The implications of a strategy of disengaged combat are relatively straightforward. Because this trend was already underway at the time of the Gulf War, and in fact for some years before that, it does not suggest any dramatic new departures from current plans. But it is a useful reminder of those areas that deserve emphasis in defense planning.

Full implementation of a strategy of disengaged combat for conventional warfare will require a thorough doctrine, and U.S. forces must be trained and exercised in its principles and familiar with its requirements. Joint exercises will be especially important because, as with all elements of the RMA, synergy is critical to disengaged combat: it is only through efficient collaborative operations among air, land, and sea forces that the principles of disengaged combat could be put into practice.

In a strategic sense, the pursuit of disengaged combat requires the ability to find and hit enemy targets over the horizon, rather than weapons systems suited for the close battle. It places a premium on intelligence, long-range sensors, long-range standoff munitions, precision targeting and

guidance, advanced optics, and the like—all things designed to locate and hit the enemy at great distance, rather than to drive up and destroy him in a slugfest. Here we see one element of the trend toward the decline in importance of heavy, mechanized ground forces: such forces are designed to fight a war that U.S. commanders should attempt to avoid, not bring about.

More broadly, developments in warfare are reducing the role of major military platforms—heavy ground vehicles, large capital ships, and advanced aircraft. With the long range of modern sensors and precision weapons, the vehicles that deliver those weapons—major platforms—need be less capable themselves. Thus Admiral Jeremiah suggests that "we may very well move away from expensive, highly sophisticated platforms in favor of cheaper *trucks* or *barges* based on commercial vehicles but crammed with state-of-the-art long-range weapons, sensors, and communications gear." The place of major platforms in the military "may not be the central position they have held for the past half-century or more," Jeremiah concludes.[61]

In both its strategic and tactical guises, disengaged combat requires great agility on the part of U.S. military forces. Land, naval, and air units must be capable of redeploying at a moment's notice, of moving about the battlefield rapidly. U.S. defense planners have already put in place the building blocks of both strategic and tactical agility. Robotics and unmanned vehicles can also play a major role in both strategic and tactical disengaged combat, supplementing and in some cases replacing manned vehicles in battle areas close to the enemy. In this sense some U.S. systems could fight an "engaged" battle while U.S. personnel remained at a safe distance from the enemy.

Moreover, and in a much more fundamental sense, the kind of unprecedented tactical agility required for disengaged combat may in fact call for more than speedy tanks. It may eventually lead the army to profound organizational innovations. Two such changes that are most likely are an increasing reliance on "middle-weight" forces employing light armored and mechanized units,[62] and a shift to the reinforced

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brigade as the basic combat unit of the army, replacing the more unwieldy division.

Disengaged combat also suggests a growing role for special operations forces. They are uniquely suited to operate in the resulting no-man's land between U.S. and enemy forces as well as far behind enemy lines, directing fire and launching disruptive raids. On a strategic level, special operations forces can participate in the strategic air campaign aimed at enemy centers of gravity, going after enemy leaders, command posts, military depots, energy supplies, and the like.

Finally, reliance on a strategy of disengaged combat also carries unpromising implications for coalition warfare. If U.S. allies did not enjoy similar capabilities, how would U.S. commanders work them into such an approach to war? Would they merely be used to mop up? Or could select allies participate in the disengaged attacks at both the strategic and tactical levels? The Gulf War suggests that a U.S. commander might make use of each of these alternatives.

VII

Finally, the revolution in military affairs points in the direction of the *civilianization* of war. In areas from the conduct of warfare, the organization of force structure, and policies toward the defense industrial base, the RMA will make use of capabilities resident more in the civilian world than in areas traditionally thought of as the defense establishment. Because of the RMA, the line between military and civilian endeavors is blurring.[63]

Of course, this has always been true for irregular warfare. The myriad of social, political, and economic factors involved in peacekeeping or counterinsurgency operations has always made them far more than purely "military" struggles. Indeed, many critics of U.S. policy in Vietnam argued precisely that the United States was treating the conflict as a military one, when in fact it was something more than that.

All of this remains true for the irregular wars of today. The need to consider nonmilitary factors may be magnified by a

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growing cause of nonmilitary conflict: the environment. And if irregular war is indeed becoming the dominant form of conflict, then war is indeed becoming a less "military" enterprise.

Even in the realm of major conventional war, however, the boundary between military and civilian efforts will dim. The accelerating rate of technology is one reason. Because of the remarkable advance of technology and the stifling system of military procurement, civilian computers, engines, optics, and other systems are far outpacing their military equivalents. Civilian products are also far cheaper. This fact has been one of the major spurs to the current drive for procurement reform, which aims at making a wider range of civilian technologies available to the military.

More fundamentally, future warfare will be information warfare, and it is therefore built upon a foundation of civilian technologies. When the primary focus of war was killing, its primary tools were the implements of killing; and the most advanced versions of those were built exclusively for military use. The technology of war, therefore, was self-generating.

Today, the trend is in the opposite direction: the substructure of war will be information dominance, and its primary building-blocks are computers, communication systems, satellites, and sensors. The essence of war is coming to rest on a foundation of civilian, rather than military, technologies.[64] Alvin and Heidi Toffler have discussed the ultimate implications of this trend in their book *War and Anti-War.* When the instruments of war are no longer tanks and guns but computer viruses, microscopic robots, and obscure germs, militaries, and indeed nation-states themselves, will lose even more of their monopoly on "force."[65] Nonlethality and civilianization are closely related phenomena.

The nature of armed forces is also changing to place more emphasis on reserves and militias, and thus on the citizen-soldier elements of military institutions. This trend is currently most apparent in Europe. After maintaining very substantial active-duty forces during the cold war, most NATO members are rushing to demobilize. Soon NATO's non-American nations will maintain barely 50 active-duty

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brigades, relying on large reserve forces for the bulk of a response to any new Russian provocations. Here in the United States, the Bottom Up Review force's ability to fight two contingencies hinges on the participation of 15 National Guard combat brigades. In a time of budgetary frugality, force structure trades off with modernization and readiness; this tradeoff is frankly admitted by the architects of the Bottom Up Review, and is increasingly evident in nations like China and Japan, as well.

The shift to smaller active-duty forces remains uneven at best. Recent developments in Russia, where reformers once proposed active armed forces as small as 1.2 million, have halted reductions at almost double that number. And everywhere, the trend toward smaller active-duty forces depends on a continuation of current trends, which, given the chaotic nature of world politics, can hardly be guaranteed.

Nonetheless, if something like current trends persist at least for a time, and if democratic reforms take root in Russia and China, the rush to demobilize may continue. If so, defense planners may be forced into a more serious consideration of concepts like civilian-based defense. In the future, militias equipped with small arms, light anti-armor weapons, and perhaps the cast-offs of active forces like tanks and MLRS might provide the basic form of deterrence against an attacker on the country's homeland. Nonviolent conflict and resistance may assume many roles formerly held by military force, especially in low-intensity conflict.[66]

Such a defense could be stiffened by the talents of people who work on the cusp of military and civilian endeavors. Computer hackers could cripple an enemy's stock market with a virus; space-age computer experts could reprogram their micromachines or nanomachines to invade and destroy the radios of passing enemy units; satellite operators could provide intelligence on enemy movements and jam enemy communications. These types of "military personnel" would need very different qualities, and have very different personal characteristics, from the sort of people who have traditionally sought military careers.[67] Meanwhile, smaller, sophisticated

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active-duty forces would conduct expeditionary tasks in peacetime and offer the nation's core striking force in war.

This kind of arrangement would have important social ramifications. The gulf between civilian and military life, seemingly narrowed by the prominent role for reserves and militias, might in fact widen because of the elite, super-specialized nature of military forces. Different forms of recruitment might be required for the two forces: reservists might be conscripted while active-duty forces were composed of volunteers, a twist on the distinction which the French already maintain today.

The ultimate result of such a trend is, of course, the disappearance of active-duty military forces altogether. As the fabric of society is increasingly woven from fiber-optic cables, civilian technicians of the future could conduct all the deterrent threats and destructive actions that comprise what might be described as "warfare" from a computer terminal. This, of course, is the stuff of science fiction, and not a result we or our children are likely to live to see. But it is hardly out of the question.

Nonlethal weapons play an important role in this same trend toward civilianized warfare. In the future, U.S. forces will seek to kill as few enemy civilians, do as little collateral damage, and—in a new twist—kill as few enemy soldiers as possible. This shift will come about because it is both possible and desirable.[68]

Various new technologies grouped under the general heading of "nonlethal weapons" will deepen and accelerate this trend. Microwave generators capable of incapacitating troops, lasers capable of temporarily blinding them, slippery gels that can prevent the use of roads or bridges, and a whole panoply of electronic warfare gadgets will allow U.S. and allied forces to conduct certain military operations, in some circumstances, without threatening a single life. U.S. forces will be able to achieve some "military" objectives—seizing a strategic location, knocking out enemy command and control, disabling an enemy unit in the field—without firing a shot.

These results, of course, will take decades to achieve. Most nonlethal technologies remain on the drawing board. Even when they are fielded, they may not be appropriate for all, or even very many, missions. As long as U.S. enemies keep using guns, war will remain a lethal enterprise, and U.S. forces will often need to shoot back. And the adoption of a fully nonlethal strategy might undermine deterrence, suggesting to future Saddam Husseins that, not only would they not risk their regime with aggression—they might not even risk the lives of their soldiers.[69] For the time being, the Defense Department views nonlethal weapons as an adjunct to, not in any way a replacement for, traditional military systems.[70]

Nonetheless, nonlethal weapons and tactics will gain ground in coming years, for a number of reasons. Given the media focus on war and the semi-isolationist mood of the American people, the corollary to the need for low U.S. casualties is the requirement for low collateral damage. The American people might not long tolerate an operation involving marginal national interests that necessitated the destruction of enemy cities or the slaughter of tens of thousands of enemy soldiers. The public revulsion, and subsequent military restraint, surrounding the famous "Highway of Death" in the Gulf War is an example of this phenomenon. Like disengaged combat, therefore, nonlethality will expand U.S. flexibility and freedom of action in using force.

Nonlethal capabilities will be especially important in irregular war, where, along with high-tech sensors and command and control systems, they could effect a true revolution in the nature of peacekeeping and counterinsurgency tactics. Crowds of demonstrators could be incapacitated rather than killed. Guerrilla groups could be denied the use of roads and trails through the use of a greasy oil rather than bombing runs. Terrorists operating at night could be blinded by lasers when they approached U.S. forces. Circuitry in radios and computers of rebel groups could be destroyed with targeted electromagnetic bursts.

Again, these capabilities will only become available over the next decade. But together they could change the way U.S. and allied military planners view missions in irregular warfare.

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And they evoke a question for future generations of defense planners: Must war involve killing? Or would any nonlethal endeavor cease to be war and become something else?

VIII

The revolution in military affairs therefore suggests a framework for defense planning composed of four pillars. They are information dominance, synergy, disengaged combat, and civilianization. A number of implications have already been drawn from each of those principles. This final section outlines some broader and more fundamental lessons of the framework as a whole.

It is interesting to note, at the outset, how the four principles fit together like pieces of a puzzle, mutually dependent and reinforcing. The lines of intersection are simply too numerous to mention. Information's dominant role creates the need for and possibility of synergy and promotes the civilianization of defense policy. Disengaged combat relies on accurate, real-time targeting information for success, and may increasingly be conducted through civilian or nonlethal means.

Like past revolutions in military affairs, the present one is an organic whole. Any one element pursued in isolation will offer only a shadow of the RMA's true potential.

It is important to note that, while all four principles apply to both conventional and unconventional war, not all of them apply in equal measure to both, and applying the principles to those very different forms of warfare will require two very different doctrines. Information dominance in conventional conflict means a very different thing from that same principle in guerrilla warfare. Disengaged combat is simply not possible in irregular war, and, as a result, traditional "warrior values"–physical toughness, courage, the willingness to give one's life for a cause—will continue to be at a premium in most forms of irregular war.

Will the RMA change the "essence" of warfare? The answer depends upon one's definitions. Classical military strategy, as represented in the works of Clausewitz and Jomini, sought to

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mass forces at a critical point and attack the enemy's center of gravity in a decisive battle. Some have argued that the RMA will invalidate such a model of warfare: forces will no longer be massed, the enemy will no longer be directly engaged, forces will no longer fight "through" a decisive point along lines nor seek a decisive battle in close combat. On the other hand, one could argue that these same concepts remain valid, but in a different sense: U.S. forces will mass fire and other military effect against enemy centers of gravity to win decisively.

This different understanding of warfare may come to rely more on the foundation of Sun Tzu than Clausewitz or Jomini. Sun Tzu's notion of winning a war without fighting a battle--at least a traditional, close battle--may become the dominant preoccupation of military institutions. Maneuver, guile, and long-range strike, rather than vast tides of close-combat attrition, will be the watchwords for U.S. commanders in the future.

It is therefore unsurprising that all four principles have always been true, to a greater or lesser degree, of irregular warfare. It was always nonlinear, based on civilian political and socioeconomic factors; successful strategies to fight irregular war always employed a high degree of synergy and "civilian" tools among their various political, military, and economic elements. This suggests that future U.S. military leaders will need more of the flexibility and innovativeness of thought characteristic of the great generals of guerrilla warfare, who have always looked to Sun Tzu rather than Clausewitz for inspiration.

In this sense, the RMA is about the blurring of lines, and may therefore work to change the fundamental essence of warfare. Distinctions between military and civilian technologies and endeavors, between strategic and tactical operations,[71] between conventional and unconventional war, and between warfare and law enforcement are all breaking down. What most historians nominate as the "essence" of warfare--two enemy soldiers braving death to kill each other on the battlefield--will remain valid in most types of combat, but not all of them. The question is how much of warfare comes to reflect a new

war-form, as the Tofflers call it, and how fundamental this change becomes.

Several specific lessons emerge from this discussion of the likely future of warfare. One stands out as especially important: the quality of military personnel. Only highly intelligent, superbly trained, well-equipped troops with high morale and wide experience will be able to flourish in the incredibly demanding atmosphere of future war. This is true of both conventional war, which is becoming faster and more complex, and irregular war, which calls for a unique blend of soldiering skills and socioeconomic sensitivity.

Indeed, high-quality troops provide a hedge against errors in exactly the sort of framework for defense planning proposed in this monograph. Clausewitz recognized that:

> it is simply not possible to construct a model for the [conduct] of war that can serve as a scaffolding on which the commander can rely for support at any time. Whenever he has to fall back on his innate talent, he will find himself outside the model and in conflict with it; no matter how versatile the code, the situation will always lead to the consequences we have already alluded to: talent and genius operate outside the rules, and theory conflicts with practice.[72]

Measures to recruit, train, and retain high quality troops in all branches of the military must therefore be among our top priorities.[73] This means, among other things, jealously guarding military pay raises and other benefits, opposing cuts in operations and maintenance accounts,[74] providing for realistic and extensive peacetime training, developing simulation capabilities and other high-technology training devices, and attempting to keep the forces equipped with modern systems. Technologies may drive the RMA, but people and organizations will carry it out. In addition to smart weapons, therefore, the RMA calls for smart organizations and smart personnel.

A second major lesson of the new framework for defense planning concerns acquisition reform. The U.S. military procurement system cannot keep up with the demands of 21st century warfare. Civilian technologies are outpacing military ones, and if, as argued above, future war will come to rest on

a foundation of civilian information technologies, this gap could bo deadly. If the Defense Department's software for combatting computer viruses, for example, is three or four years behind the viruses in the hands of an Iraqi hacker, the United States will confront a strategic vulnerability.

This lesson points to the urgent need for the kind of acquisition reforms, described by Defense Secretary Perry, that would make civilian equipment more accessible to the military by chopping away at the intervening wall of unique requirements and government regulations.

In the long run, however, this same trend may force us to ask more fundamental questions and reconsider the whole notion of a "defense industrial base." If, as suggested above, our emphasis on major platforms declines, we may be able to focus our efforts on preserving a very narrow slice of businesses–those that produce, not bombers or submarines, but advanced sensors, precision-guided weapons and their warheads, ammunition, and command and control systems. That set of industries is a much more manageable challenge for a U.S. industrial base policy than the current, vast defense base focused on producing major platforms.

Third, the revolution in military affairs renders a decisive judgment on the future military fortunes of totalitarian states. Such societies and their military establishments suffer from rigid, centralized, hierarchical command structures; slow, predictable patterns of technological innovation; and an inability to encourage the qualities of initiative and self-reliance in their military officers. The militaries of totalitarian states cannot implement any of the six elements of the RMA. They belong, as a collective group, in the dustbin of military history.

In coming decades, no totalitarian state should be able to stand up to the onslaught of democratic nations wielding the principles of the RMA. This conclusion carries dramatic implications for the threat posed by such nations as Iraq, Iran, North Korea, and a potential renewed totalitarianism in Russia. It suggests that these threats might not be nearly as great as their numbers would suggest. The easy coalition victory in the

Gulf War might, after all, be replicable in other cases in which the United States is fighting a totalitarian regime.[75]

Fourth, the RMA points to the need for dramatic organizational reforms in the Department of Defense. Joint offices should control doctrine and procurement. Hierarchies should be reduced to speed innovation and responsiveness. As Admiral Owens has proposed, joint commands should be established in peacetime. And expanded investments should be made in what Lieutenant General Frederic Brown has called a "bureaucracy of change"–those institutions, such as the Army's Training and Doctrine Command, that promote strategic thinking and doctrinal innovation.

If Sun Tzu is to be the new doctrinal inspiration for the U.S. military, then the virtues and values of special operations forces may well be the organizational model for the future. Special operations units are small, agile, flexible, able to take on a wide range of missions, highly trained and motivated, and imbued with the need for decentralized initiative. They use stealth and guile rather than brute force to achieve their objectives. These same principles will dominate the doctrines of the regular U.S. military in the years to come.

Fifth, the RMA suggests that a reevaluation of U.S. coalition strategy might be in order. It suggests, first of all, that the most helpful and appropriate place to get allied help in managing the burdens of the new world order will be in operations short of war, especially peacekeeping and peacemaking. These kinds of operations and conflict call for traditional military skills rather than high-tech wizardry, and they are precisely the more common, every-day endeavors that the United States will not be able to conduct on its own. Beyond that, U.S. commanders will be increasingly challenged to integrate other military forces into their operations in a meaningful way.

Sixth and finally, the RMA underpins the denuclearization of U.S. defense planning. As Soviet military analysts recognized a decade ago, modern conventional weapons can assume many missions previously assigned to nuclear weapons. Modern U.S. conventional forces, combined with the collapse of the Soviet Union, mean that the United States need

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not threaten nuclear war to deter conventional attacks anywhere in the world today. At a minimum, this would allow for a doctrine of no first use of weapons of mass destruction, reserving the deterrent effect of nuclear weapons for threats of retaliation against nuclear, chemical, or biological weapons.[76]

Nor is it even clear that, 10 or 20 years from now, the United States will need to threaten a nuclear response to nuclear attack. A number of analysts have already proposed nonnuclear retaliation against small nuclear attacks by regional proliferators,[77] and Paul Nitze has gone even further. The United States might consider, he writes, "converting its principal strategic deterrent from nuclear weapons to a more credible deterrence based at least in part upon 'smart' conventional weapons." Conventional weapons, Nitze points out, are "safer, cause less collateral damage and pose less threat of escalation than do nuclear weapons. They thus offer far greater flexibility." And he suggests provocatively that such a nonnuclear deterrent might someday "overcome" even the threat posed by "a first-class strategic [nuclear] arsenal, such as that of Russia."[78] The RMA therefore provides the United States with both the incentive and the means for elbowing nuclear weapons to the margins of world politics.

Taken together, these broad implications and the entirety of the preceding analysis points to a specific set of priorities for funding in the years ahead. Figure 1 summarizes these priorities. These capabilities, weapons systems, and types of forces would provide the greatest leverage in the emerging revolution in military affairs.

Priorities for U.S. Defense Investment in the 1990s.

A new *joint doctrine* for information-based, disengaged, civilianized warfare

General Capabilities

High-quality military forces

Joint and combined command, control, and communications systems

Joint schools, doctrinal centers, and procurement bodies

Capabilities for information dominance: denial systems, systems for assessment and dissemination

Defense against chemical and biological attack

Advanced sensors--visual, thermal, etc.

Strategic agility

Weapons Systems

Restrict platform development in favor of long-range, standoff precision strike systems

Nonlethal weapons

Core of stealthy aircraft

Smaller, stealthier ships

Unmanned vehicles

Force Structures

Special operating forces

Light mechanized ground forces

Brigade-sized task forces

Joint peacetime commands

Figure 1.

IX

Warfare is changing, perhaps more rapidly and fundamentally than at any time in recent history. In the coming years, U.S. defense planning will be hard-pressed to keep pace with the metamorphosis of conflict. To benefit from the RMA, the U.S. military, whether it is engaged in conventional or irregular war, will need to reform the way it plans, thinks, procures, and fights. Such transforming innovations will require a framework, some basic set of principles to help guide decisions during a period of dizzying change.

This monograph has proposed one such framework. It may have misidentified the principles; it may be wrong in many of its major assertions. Some military officers and defense planners, accustomed to relying on certain "unchanging truths about war," will undoubtedly reject some of the more dramatic suggestions offered above. And perhaps they will be right.

But this report has tried to convey something of the possible sweep and momentous importance of the trends now at work in the nature of war. It is based on the conviction that, whether or not every element of its long-range thinking is correct, the architects of U.S. defense policy ignore these trends at their peril.

The United States enjoys a proud tradition of innovative military thinkers and the development, in peacetime, of important new capabilities. If this tradition is to continue, U.S. defense planners will need to be more far-sighted than ever. For the changes of tomorrow are coming faster and with more force than the changes of yesterday. It may no longer be enough to avoid fighting the last war; now we may need to be thinking about the war *after* next.

ENDNOTES

1. This is the central theme of Alvin and Heidi Toffler, *War and Anti-War: Survival at the Dawn of the 21st Century*, Boston: Little-Brown, 1993.

2. Michael Mazarr, principal author, *The Military Technical Revolution*, Washington, DC: Center for Strategic and International Studies, 1993, pp. 16-17.

3 See Mazarr, *The Military Technical Revolution*; and Frank Barnaby, *The Automated Battlefield*, New York: The Free Press, 1986. During the cold war, Soviet military analysts contended that modern history had seen three true revolutions in military affairs. The first was the revolution in mass armies, weaponry, and mechanization, just underway in Napoleon's time, which became fully evident in the two World Wars. The second was the advent of nuclear weapons, which completely changed the nature of large-scale warfare and may, in fact, have made such warfare inherently suicidal. The third RMA outlined by Soviet analysts was the one underway today.

4. On the elements of the RMA see Frank Kendall, "Exploiting the Military-Technical Revolution," *Strategic Review*, Vol. 20, No. 2, Spring 1992, pp. 23-30.

5. Les Aspin, Secretary of Defense, *Report on the Bottom-Up Review*, Washington, DC: U.S. Department of Defense, October 1993. The report contains a few references to the "revolution in weapons technology" (p. 33), but no sustained discussion of the nature of the military-technical revolution. Indeed, the report hardly discusses the nature of warfare at all.

6. See, for example, Theresa Hitchens and Robert Holzer, "DoD Eyes 21st Century Now," *Defense News*, March 28-April 3, 1994, pp. 1, 52. Defense Secretary Perry has spoken of an emphasis on the RMA as one of the legacies he intends to leave, and has formed a large study group on the RMA within the Defense Department.

7. David Ruelle, *Chance and Chaos*, Princeton, NJ: Princeton University Press, 1991, p. 29.

8. A basic introduction to chaos theory is James Gleick, *Chaos: Making a New Science*, New York: Penguin Books, 1987.

9. Ruelle, *Chance and Chaos*, p. 81.

10. As one writer has put it, "Because of this sensitivity, causing microlevel effects to be exponentially amplified over time, long-term predictability from the observation of previous behavior becomes impossible in chaotic systems. Current behavior becomes unrelated to previous events. . ." Diana Richards, "A Chaotic Model of Power Concentration in the International System," *International Studies Quarterly*, Vol. 37, 1993, p. 58.

11. An interesting discussion of this point can be found in chapter 8 of Alasdair MacIntyre, *After Virtue: A Study in Moral Theory*, Notre Dame, IN: University of Notre Dame Press, 1981, pp. 84-102.

12. Robert Conquest, "History, Humanity, and Truth," The 1993 Jefferson Lecture in the Humanities, Stanford, CA: Hoover Institution on War, Revolution, and Peace, 1993, p. 16.

13. John Lewis Gaddis, "International Relations Theory and the End of the Cold War," *International Security*, Vol. 17, No. 3, Winter 1992-1993, p. 29. Cf. pages 27-29, 31, 39, 52, and especially 53-55 in Gaddis for further discussions of this point. And see also Gabriel A. Almond and Stephen J. Genco, "Clouds, Clocks, and the Study of Politics," *World Politics*, Vol. 20, No. 4, July 1977, which makes roughly the same argument.

14. Alan Beyerchen emphasizes that the elements of interaction and feedback noted as characteristics of war by Clausewitz are also basic elements of chaos. For example, the notion of "war as continuation of politics" implies an interaction, not a linear set-subset relationship. War is thus described, in good chaotic terms, as "an energy-consuming phenomenon involving competing and interactive factors, attention to which reveals a messy mix of order and unpredictability." Beyerchen, "Clausewitz, Nonlinearity, and the Unpredictability of War," *International Security*, Vol. 17, No. 3, Winter 1992/1993, pp. 66-75.

15. The more one knows about technology and its effect on war, van Creveld concludes sadly, "the more difficult it becomes to identify trends and make predictions." Martin van Creveld, *Technology and War*, New York: Free Press, 1989, p. 313.

16. The revolution in military affairs points to a strategy of "management of uncertainty," argues Stephen Peter Rosen, rather than "predictions of what future wars would be like. It is a mistake to tailor forces and strategies for one scenario to the exclusion of others. U.S. planners need to "construct a wide range of scenarios and conduct imaginative conflict simulations in order to explore the shape of potential wars"; Rosen, *Winning the Next War: Innovation and the Modern Military*, Ithaca: Cornell University Press, 1991. Alan Beyerchen's analysis of Clausewitz draws similar conclusions for military art. "The elegance of military axioms," he warns, echoing what he believes to be the true message of Clausewitz, "is a mirage shimmering above the distant abstractions of implicitly idealized, isolated systems; the denseness of Clausewitz's forest of caveats and qualifications more faithfully represents the conditions and contexts we actually encounter"; Beyerchen, "Clausewitz, Nonlinearity, and the Unpredictability of War," p. 89. "The work of Clausewitz," Beyerchen concludes, "indicates that knowing how the system functions at this moment does *not* guarantee that it will change only slightly in the next. Although it might remain stable, it might also suddenly, (although perhaps subtly) pass a threshold into a thoroughly different regime of behavior. And the causes of such changes in a complex system can be imperceptibly small"; *Ibid.*, p. 90.

17. As the chaos expert David Ruelle has argued,

> The textbooks may give you the impression that the role of the legislators and government officials is to find and implement an equilibrium that is particularly favorable for the community. The examples of chaos in physics teach us, however, that certain dynamical situations do not produce equilibrium but rather a chaotic, unpredictable time evolution. Legislators and government officials are thus faced with the possibility that their decisions, intended to produce a better equilibrium, will in fact lead to wild and unpredictable fluctuations, with possibly quite disastrous effects.

Ruelle, *Chance and Chaos*, pp. 84-85. The same may be true in economics, suggesting that traditional efforts by government to achieve this or that effect with a pinch in interest rates and a prod in money supply may be far less effective than commonly assumed; see Charles R. Morris, "It's Not the Economy, Stupid," *The Atlantic Monthly*, July 1993, pp. 49-62.

18. As a side note, it may be interesting to consider whether this broad unpredictability of political events helps account for the causes of deterrence failure. Why supposedly rational national leaders would take

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seemingly irrational decisions to defy deterrent threats—as Argentina did in 1982, for example, or Iraq in 1990—has long been the subject of debate. A chaotic model of world politics allows us to see deterrence failures as natural subsets of an overall order that does not conform to linear, "rational" models. Indeed, a thorough analysis of the causes of deterrence failure bears out this point. For an argument that the practice of deterrence is inherently flawed—a contention that a chaos model of world politics would support—see the chapters in Robert Jervis, Richard Ned Lebow, and Janice Gross Stein, eds., *Psychology and Deterrence*, Baltimore: Johns Hopkins University Press, 1985. Michael J. Mazarr, Don M. Snider, and James A. Blackwell, *Desert Storm: The Gulf War and What We Learned*, Boulder, CO: Westview Press, 1991, chapters 2 through 4, applies these same theories of deterrence failure specifically to the Iraqi case.

19. See, for example, Martin van Creveld's argument about non-state warfare in *The Transformation of War*, New York: The Free Press, 1991. Van Creveld is no doubt correct that non-state, non-trinitarian warfare will be *more* prevalent in the future. Chaotic models would merely suggest that it is impossible to claim, as van Creveld appears to do, that they will be the *only* kind of war. His book was published before the Persian Gulf War, and one wonders if he would admit that the war provides any counterevidence to his claim. It was, after all, a traditional state-versus-state war in almost every sense.

20. See, for example, the claims of John Mueller, *Retreat from Doomsday: The Obsolescence of Major War*, New York: Basic Books, 1989; and Edward Luttwak, "From Geopolitics to Geoeconomics," *The National Interest*, No. 20, Summer 1990, pp. 17-23. Other elements of this debate are offered in Sean M. Lynn-Jones, ed., *The Cold War and After: Prospects for Peace*, Cambridge, MA: MIT Press, 1991.

21. See John Mearsheimer, "Back to the Future: Instability in Europe After the Cold War," *International Security*, Vol. 15, No. 1, Summer 1990.

22. Let me make one point very clear at the outset: I do *not* assume that all weapons, doctrines, or technologies of the RMA are equally applicable to conventional and unconventional war. As a much more ambiguous phenomenon than conventional war, in which social, economic, and political factors predominate, irregular war is immune to many of the technologies of the RMA. It is not immune to all of them, however; and this monograph will contend that the six principles outlined below *are* equally applicable to regular and irregular war. But applying the principles will require two (or more) very different doctrines. In general, my comments will focus on the role of the RMA in conventional war.

23. These comments hint at the definition of information I have in mind: it is a broad one, encompassing *facts* (about the enemy, about friendly and allied forces, about terrain, weather, weapons systems, and the like) as well

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as *command and control* (the exchange of facts and orders). The seminal current work in the field of the RMA and command and control is Kenneth Allard, *Command, Control, and the Common Defense*, New Haven: Yale University Press, 1990. See also General Gordon R. Sullivan, "War in the Information Age," *Military Review*, forthcoming; Sullivan's superb and insightful piece echoes many of the themes presented in this section.

24. For more details on information warfare, see Alan D. Campen, ed., *The First Information War*, Fairfax, VA: AFCEA International Press, 1992; Martin Libicki, "Silicon and Security in the 21st Century," *Strategic Review*, Vol. 20, No. 3, Summer 1992; and Libicki and James Hazlett, "Do We Need an Information Corps?" *Joint Force Quarterly*, Vol. 1, No. 2, Autumn 1993, pp. 88-97.

25. Martin van Creveld has spoken of the critical importance of the "infrastructure" of war, the logistical and communications network that links a force together. This infrastructure, van Creveld notes, "goes a long way to dictate the character of organization, logistics, intelligence, strategy, even the concept of battle itself. Without it the conduct of armed conflict would be impossible, and its very existence, inconceivable"; van Creveld, *Technology and War*, p. 311-312. In the past, this infrastructure was based on roads and rail; in the future, the military will increasingly rely on an *informational* infrastructure based on the computer chip and the fiber-optic cable.

26. See Mazarr, *The Military Technical Revolution*, p. 20. It could be argued that the Air Force's strategy of the strategic application of airpower to enemy critical nodes is an example of information dominance, because many of those nodes are command and control or information-related targets such as radars, telephone networking stations, and radio facilities.

27. One interesting result is to strengthen the chaotic nature of warfare mentioned earlier. Information flows are rapid and unpredictable; advanced command and control systems magnify the feedback loop characteristic of chaotic systems and accelerate the feedback process. Ken Allard refers to the "organized chaos of information gathering." Allard, "The Future of Command and Control: Toward a Paradigm of Information Warfare," chapter to be included in Michael J. Mazarr and Benjamin Ederington, eds., *Turning Point: The Gulf War and the Future of U.S. Military Strategy*, New York: St. Martin's Press, forthcoming; cited from mimeographed draft chapter, p. 27.

28. Ken Allard argues that such a doctrine could become the central organizing principle for U.S. military forces, replacing the service-oriented paradigms of today. The American defense establishment "has a long history of organizing concepts that fall short of capturing the essence of what it means to be a superpower with land, sea, and aerospace forces as well as global interests," Allard writes. "The information war

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paradigm—inchoate, uncertain, and indistinct though it is—represents a possible alternative, precisely because it embraces each of these operational environments as well as the electromagnetic spectrum." Allard, "The Future of Command and Control," p. 31. With such projects as C4I for the Warrior, Corporate Information Management, and the Navy's Space and Electronic Warfare Initiative, the Defense Department is laying fertile ground for the latter-day architects of such an information warfare doctrine.

29. See Sullivan, "War in the Information Age."

30. See, for example, Brown, *The U.S. Army in Transition II*, pp. 161-162.

31. Kendall, "Exploiting the Military Technical Revolution," p. 26.

32. Martin C. Libicki and James A. Hazlett, "Do We Need an Information Corps?" *Joint Force Quarterly*, No. 2, Autumn 1993, pp. 88-97. Their notion is that such an organization would help integrate information warfare functions, encourage innovation in this area, and help grant information warriors a unique ethos and culture. The obvious objection is that the nature of information belies such an organizational innovation: information lies at the core of all military operations; we cannot-and should not—attempt to split it off into a separate institution. Such an action flies in the face of the synergy and integration information warfare demands. But Libicki and Hazlett correctly recognize the fact that, without institutional muscle, information warfare will continue to be viewed in a dozen different ways by the services, and its equipment and personnel will continue to get short shrift when compared with warfighting platforms. An alternative idea might be the creation of a joint, unified Information Command. While recognizing that information is integral to all military operations, this command would take control of some relatively unique information-related functions. It could maintain intelligence and attack plans designed to collapse an enemy's information network, plot computer virus assaults, seek ways to deny critical information to the enemy, and so on. The model here, of course, is Special Operations Command. Obviously, special operations are an integral part of nearly every military effort. But having their own unique command has given these forces better influence, budgetary authority, prominence, and pride. An Information Command could do the same for information warriors.

33. Alvin and Heidi Toffler, *War and Anti-War*, p. 238.

34. The points which follow, and other perils of information warfare, are outlined in greater detail and eloquence in Eliot Cohen, "The Mystique of U.S. Air Power," *Foreign Affairs*, Vol. 73, No. 1, January-February 1994, pp. 112-116.

35. Alvin and Heidi Toffler, *War and Anti-War*, pp. 149-150.

36. The overall system, writes Ken Allard, must be "capable of winning even after the computer dies"; Allard, "The Future of Command and Control," p. 13.

37. General Sullivan argues that networks provide the most telling model for war in the information age—interdependent webs of relationships, rather than the stand-alone capabilities of earlier eras. See Sullivan, "War in the Information Age."

38. Defense Secretary William Perry, before joining the Clinton administration, wrote of the interdependence of U.S. combat systems in the Gulf that "The effectiveness of the coalition's defense suppression tactics depended upon the precision-guided weapons; the effectiveness of the precision-guided weapons in turn depended on the intelligence data that identified and located targets; and the very survivability of the intelligence systems depended on the effectiveness of the coalition's defense suppression systems"; William J. Perry, "Desert Storm and Deterrence," Foreign Affairs, Vol. 70, No. 4, Fall 1991, p. 76. Army Chief of Staff Gordon Sullivan points to the accelerating trend of combined-arms units and the need for land forces "fully integrated" with naval and air forces; General Gordon L. Sullivan and Colonel James M. Dubik, USA, "Land Warfare in the 21st Century," Military Review, Vol. LXXIII, No. 9, September 1993, pp. 27-28. A Navy officer similarly speaks of "joint integrated strike forces" built around a carrier or a division that would nurture personal contacts and exercises down to mid-level officers; Commander James Stavridis, USN, "To Begin Again," U.S. Naval Institute Proceedings, Vol. 119, No. 7, July 1993, pp. 38-39.

39. Yet even today, each service buys its own command, control, and communication systems, an arrangement that will not long survive the RMA; Allard, "The Future of Command and Control," pp. 78, 14, and 24.

40. See Stephen Peter Rosen, "Service Redundancy: Waste or Hidden Capability?" Joint Force Quarterly, No. 1, Summer 1993, pp. 36-39.

41. As Martin van Creveld and Edward Luttwak have repeatedly emphasized, the quest for "efficiency" in the organization of military forces may be chimeric. Because war, as suggested above, remains a chaotic enterprise, attempting to impose linear models of efficiency and "streamline" the military, as van Creveld puts it, to create "a perfect one-to-one fit" between means and ends—or, in this case, between weapons systems and missions—is a dangerous mistake. As a result, a solution that attempted to eliminate "any redundant or idle resources" would, when fighting a war, "be useless or worse." Van Creveld, Technology and War, pp. 318, 317. Van Creveld continues that:

The conduct of war against an intelligent opponent differs from the management of a large-scale technological system precisely in that

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efficiency and effectiveness, the concentration and employment of the greatest possible force on the one hand and military success on the other, are not the same even in the short run, or (one might well argue) particularly in the long run. On the contrary, there are any number of occasions when military effectiveness is not only compatible with diminished efficiency but positively demands that it be sacrificed.

Ibid., p. 315. Van Creveld gives as an example the long-desired goal of standardization which, in addition to simplifying the procurement of spare parts and the like, also "make[s] things easy for the enemy"; *Ibid.*, p. 319.

42. For example, merely because a narrow interpretation of a few missions would suggest that B-2 bombers could perform many of the attack missions of carrier air does not suggest we can henceforth stop building carriers, which have a variety of political uses and unique military value that bombers do not. And as van Creveld argues, eliminating redundancy benefits the United States by saving money in peacetime—and benefits our enemy, by reducing the number of weapons he must confront, in wartime. If an enemy could prepare only for B-2 attacks and need not worry about carrier-based aircraft, special forces raids, or cruise missiles, its task would be considerably simplified. Some will object that this claim denies the true implications of the RMA. How can we be so sure we will have aircraft carriers if the nature of war is changing so rapidly? The point is a good one, but it does not deny my claim here. The RMA may eventually require the U.S. military to replace aircraft carriers, tactical aircraft, and large ground forces with some new kinds of armed forces, but this will only occur after some decades; in the meantime, we can be reasonably certain that these systems, or something like them, will continue to exist. But even more importantly, once the RMA has brought a new generation of armed forces into being, the same argument being made here will prevail: each "service" will best use its capabilities by deciding how it can participate in a given "mission," rather than whether it can do that mission all on its own.

43. Admiral William Owens, "Living Jointness," *Joint Force Quarterly*, No. 3, Winter 1993-1994, pp. 7-14.

44. A superb example of this is the *Joint Force Quarterly*, published by the National Defense University, which contains articles on all aspects of joint force operations.

45. See "Joint Warfighting Center," *Joint Force Quarterly*, No. 2, Autumn 1993, pp. 112-113.

46. Robert A. Doughty, "Reforming Joint Doctrine," *Joint Force Quarterly*, No. 1, Summer 1993, pp. 40-47.

47. Admiral Paul David Miller, "A New Mission for Atlantic Command," *Joint Force Quarterly*, No. 1, Summer 1993, pp. 80-87.

48. Owens, "Living Jointness," p. 9.

49. Kendall, "Exploiting the Military Technical Revolution," p. 28.

50. Of course, aircraft have ranges of hundreds of miles, and so are not restricted to close combat operations; but enemy aircraft will often target U.S. forces deployed in the field, and if those forces can maintain a separation from the enemy, they may have better opportunities to intercept attacking aircraft.

51. Martin Libicki writes that the future battlefield will be composed of "a dense grid of millions—perhaps billions—of sensors and emitters which...illuminate, classify and target everything large enough to be worth destroying" backed up by "armies of precision guided munitions, grown smaller, lighter, (faster and cheaper) which are directed to destroy whatever looks interesting." As a result of this deadly marriage, combatants will be able to create "a joint killing field, virtually impenetrable to the other except at very high cost," as in World War I. "This has the potential of reducing all war to siege operations," he concludes. Libicki, "Silicon and Security in the Twenty-First Century," pp. 63-64.

52. General Gordon Sullivan and Colonel James Dubik have proposed a number of trends in land warfare, and two of them bear on this point. They argue that the increasing lethality of weapons will require greater dispersion, and point out that this trend has been underway for some time. In antiquity, they argue, armies fought in a concentration of 100,000 men per square kilometer; by the Napoleonic era, this had declined to 4,800 men per square kilometer; in World War I it was down to 404, in World War II to 36, and in the Gulf War to a minuscule 2.34 men per square kilometer. As a result, invisibility is of increasing importance to ground forces. Sullivan and Dubik, "Land Warfare in the 21st Century," pp. 22-23, 28-29. These same principles hold at sea and in the air as well.

53. This principle partly contradicts the age-old dominance of attrition in U.S. military planning. As Robert Leonhard has suggested, in U.S. Army doctrine, "Virtually every effort. . .seems bent on fighting toe-to-toe with a prepared enemy, leaning into his strength, and outlasting him rather than outthinking him." Leonhard, *The Art of Maneuver: Maneuver-Warfare Theory and AirLand Battle*, Novato, CA: Presidio Press, 1991, p. 4. AirLand Battle began a trend away from this line of thinking (although Leonhard contends it is a weak trend so far); disengaged and nonlinear combat will continue along that same line.

54. Again we see the implications of simultaneous warfare—thousands of attacks all at once against a spectrum of targets throughout the theater

of operations. This is what Frank Kendall has in mind with his "Joint Attack Warfare Strategy"; see Kendall, "Exploiting the Military Technical Revolution," p. 28. See also Frederick R. Strain, "The New Joint Warfare," *Joint Force Quarterly*, No. 2, Autumn 1993, pp. 18-22.

55. Admiral David E. Jeremiah, "What's Ahead for the Armed Forces," *Joint Force Quarterly*, No. 1, Summer 1993, pp. 33-34.

56. Sir Michael Howard, "How Much Can Technology Change Warfare?" Presentation to the Fifth Annual Conference on Strategy, U.S. Army War College, Carlisle Barracks, PA, April 27, 1994.

57. Nonlethal weapons can also play a role in disengaged combat. By immobilizing or rendering inoperable enemy troops and equipment, nonlethals could help achieve U.S. strategic and tactical goals without direct combat. That they would do so without imposing massive casualties may be a good or a bad thing, depending on the requirements of the moment. Ironically, in this sense nonlethals can be seen as analogous to tactical nuclear weapons. Both are an unusual and unique form of military tool which does not engage the enemy directly in a traditional form of force-on-force battle, but which instead breaks up its forces and renders them ineffective. Nonlethals simply offer a far more humane way of doing so.

58. See Barnaby, *The Automated Battlefield*, pp. 144, 148.

59. The U.S. European Command has already developed a concept for a nonlinear battlefield; see Kendall, "Exploiting the Military Technical Revolution," pp. 24, 26.

60. Jeremiah, "What's Ahead for the Armed Forces," p. 33.

61. *Ibid.*, p. 32. Frank Kendall agrees that changes in warfare imply "a greater reliance on fire support systems and less reliance on close combat operations." Martin Libicki, looking at the increasing lethality of the battlefield, points out that "it is hard to understand how the large platforms with which wars are now fought will be anything other than dinosaurs several decades hence"; Libicki, "Silicon and Security," p. 64.

62. This case is made in Michael J. Mazarr, *Light Forces and the Future of U.S. Military Strategy*, Washington, DC: Brassey's, 1990. See also Lieutenant Colonel Craig Whelden, USA, "Light Cavalry: Strategic Force for the Future," *Military Review*, Vol. LXXIII, No. 4, April 1993, pp. 13-20; and Peter F. Herrly, "Middleweight Forces and the Army's Deployability Dilemma," *Parameters*, Vol. XIX, No. 3, September 1989, pp. 46-59.

63. Of course, one of the oldest themes in military history is that "war is a continuation of politics." In a strategic sense, therefore, one could argue that war should never be, and indeed has not been, divorced from "civilian"

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concerns. My argument here is that, at the tactical level, the actual practice of warfare will become more and more "civilianized."

64. Martin Libicki makes this point in dramatic fashion in "Silicon and Security." "Military power," he writes, "(if such a concept makes sense in such an era) is likely to belong to those who can best master the technologies and economics of building and running" information grids (p. 64). The revolution in information technologies, he points out, "is being pushed, not by military but by commercial developments."(p. 65)

65. Alvin and Heidi Toffler, *War and Anti War*, see especially pages 87-220 for a discussion of these new "war-forms."

66. See, for example, Gene Sharp, *Civilian-Based Defense: A Post-Military Weapons System*, Princeton: Princeton University Press, 1990; and Peter Ackerman and Christopher Kruegler, *Strategic Nonviolent Conflict: The Dynamics of People Power in the 20th Century*, Westport, CT: Praeger, 1994.

67. See Libicki and Hazlett, "Do We Need and Information Corps?"

68. See Harvey M. Sapolsky and Sharon K. Weiner, "War Without Killing," Massachusetts Institute of Technology *Breakthroughs*, Vol. 2, No. 2, Winter 1992-1993, pp. 1-5.

69. Eliot Cohen argues all of this, and pours cold water on the notion of nonlethal technologies, in "The Mystique of U.S. Air Power," pp. 120-123.

70. Barbara Opall, "DoD to Boost Nonlethal Options," *Defense News*, March 28-April 3, 1994, p. 46.

71. See, for example, Douglas A. MacGregor, "Future Battle: The Merging Levels of War," *Parameters*, Vol. 22, No. 4, Winter 1992-1993, pp. 33-47.

72. Carl von Clausewitz, *On War*, translated and indexed by Michael Howard and Peter Paret, Princeton: Princeton University Press, 1989, p. 140.

73. This point is axiomatic in virtually all studies of the future of warfare. See Rosen, *Winning the Next War*, pp. 251-253; Barnaby, *The Automated Battlefield*, p. 144; Major General William M. Steele and Colonel Edward E. Thurman, USA, "The Mind is the Key to Victory," *Military Review*, Vol. LXXIII, No. 7, July 1993, pp. 12-19; and Leonhard, *The Art of Maneuver*, p. 241.

74. This is especially true when the cuts are indirect and therefore less visible. A number of the Defense Department's so-called "new initiatives,"

such as peacekeeping, defense conversion, and environmental cleanup, are being funded partly out of the overall DoD operations and maintenance account. The claimed increase in O&M funds for FY1995, some $5 billion dollars, has in fact been wiped out by a similar increase in spending on environmental restoration. If we are not careful, we will create hollow forces in the name of readiness.

75. There are exceptions, of course; if we are attacking into North Korea, for example, the combination of the North's dug-in defenses and its peoples' desire to protect their homeland would make the North a tough nut to crack.

76. With conventional deterrence fading as a mission for nuclear forces, chemical and biological deterrence might not last much longer. Strategic conventional attacks of the sort described above, along with political and economic sanctions imposed by increasingly robust international organizations, should provide plenty of options for deterring, and if necessary retaliating for, chemical or biological use.

77. See, for example, Seth Cropsey, "The Only Credible Deterrent," *Foreign Affairs*, Vol. 73, No. 2, March/April 1994, pp. 14-20; and Lewis Dunn, "Rethinking the Nuclear Equation: The United States and the New Nuclear Powers," *The Washington Quarterly*, Vol. 17, No. 1, Winter 1994, pp. 5-25.

78. Paul H. Nitze, "Is It Time to Junk Our Nukes?" *The Washington Post*, January 16, 1994, pp. C1, C2; emphasis added.

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